3. *Function of the Cerebellum.*—R. Dunn, Esq., reported to the Royal Medical and Chirurgical Society (March 13, 1849), an interesting case of apoplexy of the cerebellum bearing upon this disputed point.

The patient was a man, fifty-two years of age, whose sight had for some years been much impaired, from an amaurotic affection. The author was first called to attend him in June, 1843, when he was suffering from cephaloma and febrile disturbance. This attack left his sight more impaired. About two years ago, he became unfortunate in business, and from that time his mind was weak and excitable. On the last day of April, 1848, he was seized, during the night, with sickness and faintness, and getting out of bed, fell, as it was thought, in a fainting fit. The author found him in a low, exhausted state, and cold, but complaining of pain, heat, and uneasiness in the back part of his head. The latter symptoms continued for some days. There was no paralysis, but his mind was weaker and more confused than before, and his emotional excitability increased. Early in May, his wife mentioned that he had become subject to a constant desire for sexual intercourse; that his conduct in this respect was very different from what it had been before his late attack. By the advice of the author, he left home for about three weeks, without his wife. On his return, the desire of sexual intercourse was abated, and from this time was gradually lost. There was now observed an unsteadiness of gait, which increased, and for some time before his death was attended by weakness and stiffness of the left leg and foot. On the 6th of September, he was seized with an apoplectic attack, and died in less than four hours. After death, the vessels on the surface of the brain were found turgid. The convolutions of the brain were shrunken, deficient in firmness, and of a dingy-yellow colour. The optic nerves, shrunken and of a dingy colour, were, together with the substance of the brain around them, in the cerebral part of their course, softened. The whole region of the mesocephale had an unhealthy aspect. The interior of the right hemisphere of the cerebellum was a softened, pulpy mass, in the midst of which was an apoplectic clot of the size of a pullet's egg. The softening extended inwardly, beyond the centre of the median lobe, implicating the fibrous strands of the middle and inferior planes; and outwardly, near to the surface of the hemisphere. The whole arterial system of the brain presented the diseased condition which results from cartilaginous and osseous deposit between the coats of the vessels. This state was remarkably apparent in the vertebral arteries, especially in the cerebellar branch, from which the hemorrhage appeared to have taken place. The author regards this state of the vessels as the primary cause of disease. He believes that the first attack in April was of the same nature as the fatal seizure. Around the first apoplectic clot, inflammation, he thinks, was set up in the cerebellum, and this terminated in disorganization. To the inflammatory state of the cerebellum he refers the exaltation of the sexual propensity; to the stage of disorganization, the depression of that feeling, and the disturbance of the powers of locomotion—namely, the tottering gait, from defective power of co-ordination, ending in a weak and stiffened condition of the left leg. He refers to another similar case which had come under his observation. He points out that the median lobe of the cerebellum is a primitive and independent part, and argues that it is the sensory ganglion of the sexual instinct, and belongs to the same category as the optic, olfactory, and auditory ganglia; while he thinks the two cases he has noticed afford pathological proof that another office of the cerebellum is that of a regulator and co-ordinator of the muscular actions, especially of those subservient to locomotion, and to the maintenance of the equilibrium of the body.

In the discussion which followed the reading of this case, Dr. Marshall Hall and Prof. Owen denied that the cerebellum was the seat of sexual instinct, while Dr. Carpenter sustained that view.—*Lancet,* March 24th, 1849.

4. *On the Power to repair Damages sustained by Injury, and to Reproduce Lost Parts.*—Mr. Paget, in his extremely interesting lectures delivered before the Royal College of Surgeons, makes the following remarks on this subject:—

"The power to repair the damages sustained by injury, and to reproduce lost parts, appears to belong, in some measure, to all bodies that have definite form and construction. It is not an exclusive property of living beings; for even crystals will repair themselves when, after pieces have been broken from them, they are placed in the same conditions in which they were first formed. I know not what amount of mutual illustration, if any, the repair of crystals and living bodies may afford; but, in any case, we may trace here something like an universal property of bodies that are naturally and orderly constructed; all, in favourable circumstances, can repair at least some of the damages to which they are liable from the violence of external forces.

"But, to speak only of the repair and reproduction that occur in the several orders of the animal kingdom; among these they exist in singularly different degrees, and in such as can be only partially included in rules or general expressions. The general statement sometimes made, that the reparative power in each species bears an inverse ratio to its position in the scale of animal life, is certainly not proved; and many instances are contrary to it, such as the great reparative power possessed by the triton and other lizards, and the apparently complete absence of it in the perfect insects. Rather, the general rule which we may expect to find true, and for which there is already much evidence, may be, that the reparative power bears an inverse proportion to the amount of germ-power consumed in the development and growth of the individual, and in its maintenance in the perfect state.

"Our ideas of the consumption of power in the organization of matter, are, perhaps unavoidably, very vague; yet are there facts enough to prove that the power which can issue from the mysterious properties of a germ is limited; that it is not ever communicated to an indefinite quantity of matter; and there are enough to justify the hypothesis, that the germ power, thus limited, is in some measure consumed in the development of every new structure, and, in a less measure, in the growth and maintenance of those already formed. The instances to which I shall refer are explicable on this hypothesis, and are, therefore, evidences of its probability.

"First, then, it appears constantly true that the reparative power is greater in all parts of the young than of the older individuals of all species. Even when we compare individuals that have all attained their highest development and growth, this rule seems to be true. We know it from general observations of the results of similar injuries and diseases in persons of different ages; numerous as the exceptions may be, the general rule seems true. And it is yet more evidently proved in the case of some lower animals. Spallanzani mentions it expressly in regard to the reproduction of the tail of the tadpole. The quickness with which the work of reproduction is both begun and perfected, was always, in his experiments, in an inverse ratio to the age of the tadpole. He says the same for the reproduction of the legs of salamanders, and it is only in young frogs and toads that any reproduction of the limbs will take place. So, too, in experiments on the repair of fractures, the union of tendons and the like, in the Mammalia; one may see abundant evidence that the vigour and celerity of the process are in an inverse proportion to the animal's age. There is, indeed, some reason to believe that, in the very early period of embryonic life, a true reproduction of parts of limbs may take place, even in the human species; for (not to speak of the possibility that supernumerary members may sometimes have been formed in consequence of accidental fission of the budding limbs of the embryo), there are some cases in which fingers are found on the stumps of arms in such circumstances as justify the belief that, after a limb had been accidentally amputated in the uterus, these had been produced on its remaining portion.

"All these facts agree well with the belief that the germ-power is gradually diminished in the acts of organizing matter for the maintenance of the body; and the difference between the reparative power in children and that in adults appears so much greater than the difference in adults of different ages, that it is probable the germ-power is more diminished by growth than by mere maintenance.

"However this may be, it seems certain that the capacity for the repair or reproduction of injured parts is much more diminished by development than by growth or maintenance of the body; *i. e.*, much more by those transformations of parts by which they become fitted for higher offices, than by the multiplication or maintenance of those that are already perfect in their kind and function. In other words, to improve a part requires much more, and more perfect, formative power, than to increase it does.

"This, as a general principle, is exemplified in many instances. In the greater part of congenital malformations, we find arrest of development, but no hindrance of growth; as a heart, in which a septum fails to be developed, yet grows to its full bulk. So, if tadpoles be excluded from due light and heat, their development will be much retarded, but their growth will be less checked. So, too, in the miscalled cultivation and improvement of flowers, growth is increased, but development is hindered; and an excess of coloured leaves is formed, instead of the due number of male and female organs. Or, again, in an old ulcer or a sinus, cells may be continually reproduced, maintaining or even increasing the granulations, yet they will not develop themselves into cellular tissue and cuticle for the healing of the part; and so, even when repair and reproduction have gone far towards their ultimate achievement, that which takes a longer time, and oftener fails, is the improvement, the perfecting of the new material, by its final development. This is observed in all cases of reproduced limbs, and even in ordinary scars.

"These facts (and there are many others like them) seem to justify the expression that, not only more favourable conditions, but also a larger amount of organizing force, is expended in development than in growth. If we may thus interpret the facts, they will be collateral evidence for the belief that, in different species of animals, the reparative power will bear an inverse ratio to the amount of development already passed through; so that, for each species, in its perfect state, the reparative power might be measured by the degree of likeness between the embryonic and the perfect form, structure, and composition. The greater the sum of dissimilarities in all these respects between the embryo and the perfect animal, the less seems to be the reparative power in the latter.

"It is consistent with this that the highest amount of reparative power exists in those lowest polypes, in which, as my colleague has so ably argued, the materials of the germ mass yet remain, not transformed, but multiplied, and, as it were, grouped into the shape of their bodies. In the fresh water hydra, the power of the germ appears communicated without loss to all the cells that descend by multiplication from the original germ cells; provided only the cells are not developed into higher forms or into subserviency to special functions. In the hydra viridis, and hydra fusca, it seems literally true that any minute cluster of cells derived by mere multiplication from those of the germ mass, may, after being separated from the perfect body, reproduce the perfect form. This is the general truth of the numerous experiments performed on hydræ by Trembley, Roesel, and others. They have been so often quoted, that I need not do more than mention the greatest instances of reproductive power that they showed.

"Trembley cut a hydra into four pieces; each became a perfect hydra; and while they were growing, he cut each of these four into two or three. These fractions of the quarters being on their way to become perfect, he again divided these, and thus he went on, till from the one hydra he obtained fifty. All these became perfect; he kept many of them for more than two years, and they multiplied by their natural gemmation just as much as others that had never been divided. So that a division by fifty did not perceptibly diminish the power of the germ present in the polype that was thus subdivided. Again, he cut similar polypes longitudinally, and in an hour or less each half had rolled itself, and seamed up its cut edges, so as to be a perfect hydra. He split them into four—he quartered them—he cut them into as many pieces as he could, and nearly every piece became a perfect hydra. He slit one into seven pieces, leaving them all connected by the tail, and the hydra became seven-headed, and he saw all the heads eating at the same time. He cut off the seven heads, and, hydra-like, they sprang forth again. And even the fabulist dared not invent such a prodigy as the naturalist now saw. The heads of the Lernæan hydra perished after excision; the heads of this hydra grew for themselves bodies, and multiplied with as much vigour as their parent-trunk.

"Now these instances may suffice to show that in the lowest polypes the process of reproduction after injury confounds itself with that of their natural generation by gemmation, or, as it probably more rarely happens, by spontaneous fission. We cannot discern a distinction between them; and there are some things which seem to prove the identity of the power which operates on both. Thus, in both alike, the formative power is limited according to the specific characters of the hydra; immense as the power of increase is, which may be brought into action by the mutilations of the hydra, yet that power cannot be made to produce a hydra of much more than ordinary size, or to raise one above its ordinary specific characters. And again, the identity of the power is shown in this,—that the natural act of gemmation retards that of reproduction after injury. Trembley particularly observes that, when a hydra, from which the head and tentacula had been cut off, gemmated, the reproduction of the tentacula was retarded soon after the gemmule appeared.

"The instance of the hydra is only one of many proving it to be a general law, that a large power of repair and reproduction after injury exists in the species in which propagation by spontaneous fission, or by gemmation, is possible. I need not say how consistent this is with Professor Owen's doctrine,—that partheno-genesis, or the capacity of generating without previous impregnation of the parent, is dependent on a retention of a part of the original germ-cells, or of their direct and untransformed descendants, within the body of that parent. Wherever such cells are, there is the power, without the need of impregnation, of producing a new individual; and in all the instances in which such cells form part of the general substance or parenchyma of the body, an injury may be said to act only as a stimulus, exciting the premature exercise of a ready power, which, in the natural case, appears as the generative, but, in the accidental case, appears as the reparative power.

"I need not enumerate the species which manifest this coincidence of the power of propagating by gemmation or fission, and of reproducing large portions of the body, and even of reconstructing, from fragments, the whole body. They include, as chief examples, the actineæ—which, after bisection, form two perfect individuals—and the holothuriæ, which, as Sir J. G. Dalyell has observed, when hurt or handled, will eject all their viscera, leaving their body a mere empty sac, and yet in three or four months will have all their viscera regenerated. They include, also, from among the anellata, the young nereids, and those species of nais, on which Bonnet, Spallanzani, and others, made their marvellous experiments—experiments of which the climax seemed to be achieved when a nais was cut by M. Lyonnet into thirty or forty separate pieces, and there were produced from these fragments as many perfect individuals.

"Instead of dwelling on these instances, let me mention some observations, made by Sir J. G. Dalyell, upon other polypes, which seem calculated to illustrate in a remarkable manner the general laws of the reparative processes in even the higher animals.

"In the hydra tuba—the species of which he has traced that marvellous development into medusæ—he has found that, when cut in halves, each half may regain the perfect form; but this perfect form is regained only very slowly, and, as it were, by a gradual improvement of parts that are, at first, ill-formed. The diagram, copied from his plate, shows these stages of improvement. The fact may possibly be explained (as he suggests) by the mutilation having disturbed the progress of the hydra in its development of young medusæ; for the experiment was made in March, nearly at the time when the series of changes should have commenced. But, if I may venture not to accept the suggestion of so admirable an observer, I should suspect rather that this is an instance of gradual recovery of perfection, such as we see more generally in the repair of injuries and diseases in the higher animals.

"He has noticed something of the same kind, and more definite, in the tubularia indivisa, one of his experiments on which is illustrated by this diagram, copied from his representation of it. A fine specimen was cut near its root, and after the natural fall of its head, the summit of its stem was cloven. An imperfect head was first produced, at right angles to the stem, from one portion of the cleft; after its fall, another and more nearly perfect one was regenerated, and, as it grew, improved yet more. A third appeared, and then a fourth, which was yet more nearly perfect, though the stem was thick, and the tentacula imperfect. The cleft was almost healed; and now a fifth head was formed quite perfect; and after it, as perfectly, a sixth and seventh head. All these were produced in fifteen months.

"The lower half of this specimen had been cut off four months after the separation of the stem. Its upper end bore: first, an abortive head; then secondly, one which advanced further in development; a third, much better; and then, in succession, other four, which were all well formed.

"The upper portion of this lower half of the stem now showing signs of decay, a portion was cut from its lowest part, and further manifested the reproductive power of the stem; for three heads were produced from the upper end of the piece cut off, and four from the lower end of the upper piece which had seemed to be decaying. In five hundred and fifty days this specimen had grown twenty-two heads.

"Now, I cannot but think that we have, in these instances of gradual recovery from the effects of injury, a type of that gradual return to the perfect form and composition, which are noticed in the higher animals. Our theory of the process of nutrition leads us to believe that, in the constant mutation of particles in nutrition, those elements of the blood, or of any structure that have been altered by disease, in due time regenerate or die, and are cast off or absorbed, and that those which next succeed to them partake, through the assimilative force, of the same morbid character; but that, every time of renewal, the new particles, under the influence of the germ-power, approach a step nearer to the perfect state. Thus, as it were, each generation of new particles is more nearly perfect, till all the effects of the injury or the disease are quite obliterated. Surely, in the gradual recovery of perfection by these polypes, we have an apt illustration of the theory—one which almost proves its justice."—*Lond. Med. Gazette*, June, 1849.

5. *Microscopical Examination of the Contents of the Hepatic Ducts, with Conclusions founded thereon.* By T. Wharton Jones, F. R. S.—In the contents of the larger hepatic ducts there are seen, on microscopical examination: 1st, the detached columnar epithelium cells of the ducts themselves; 2d, free oval nuclei, which appear to have been derived from cells of this kind; 3d, free round nuclei, apparently derived from the proper hepatic cells; 4th, minute granules, free or in amorphous flakes, globules of oil, and fragments of cell walls. In addition to these, in the smaller ducts, are found cells resembling those of the parenchyma of the liver, except in being usually paler, on account of the contained granules and globules being fewer and more minute. Having, by way of comparison, examined the contents of the pancreatic duct, and recognized in it, with its own columnar epithelium, the free nuclei and granular amorphous matter resulting from the disintegration of the secreting cells developed within the vesicles of that gland, the author considers that, from the analogy of the products of the secreting action in the two cases, an argument may be fairly drawn in favour of the analogy in essential nature between the cells of the hepatic parenchyma and the endogenous cells of the pancreas and other glands of ordinary construction. This deduction helps to confirm the view of the structure of the liver propounded by Dr. Leidy.—*Phil. Trans.*, 1848.

ORGANIC CHEMISTRY.

6. *Sugar found in the Blood, Tissue of the Kidney, &c., but not in the Spleen and Pancreas, of a Diabetic Patient, who died suddenly.*—M. Bernard lately examined the body of a diabetic patient, under the care of M. Rayer, who died suddenly on the third day after admission into hospital. The urine, drawn off while the patient was yet warm, contained a large quantity of sugar. The liver, misshapen, and much larger than in the natural state, contained also a large proportion. The kidneys were also enlarged; the left kidney weighed 245 grammes